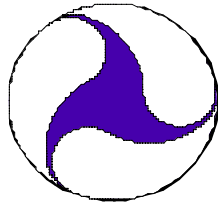


**Module 4A – Operational Implications of Information Sharing →
Instructors Guide**

M4A.1.: Cover Slide

Module 4A
Operational Implications of
Information Sharing





Module Objectives

- ◆ Describe how information sharing between ITS infrastructure components will influence agency operations (and vice-versa)
- ◆ Describe how to accomplish “real” infrastructure integration within today’s transportation environment

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Delivery:

- Explain
 - “Bullet” points listed on this slide provide the framework for subsequent presentation/discussion within this module
 - Description/explanation for each “bullet” will follow shortly
 - Need to think “outside-the-box” when considering operational implications of integration/information sharing
 - Need to identify all of the ways in which regional ITS integration can be realized in order to support agency operations without any “adverse” affects
- Instructor facilitates discussion (if any)

Output:

- N/A

Notes:

- Do not “dawdle” on this slide → move on!!



Integration Between Agencies

- ◆ Identify ITS stakeholders
- ◆ Define agency concept-of-operations
- ◆ Establish pre-defined operational policies and procedures between agencies

Delivery:

- Explain
 - Description/explanation for each “bullet” will follow shortly
 - That you need to know/determine → “who will do what and how will they do it”
 - “Concept-of-operations” should first be looked at on an “agency-by-agency” basis
 - Then, looked at from a regional perspective
- Instructor facilitates discussion (if any)

Output:

- N/A

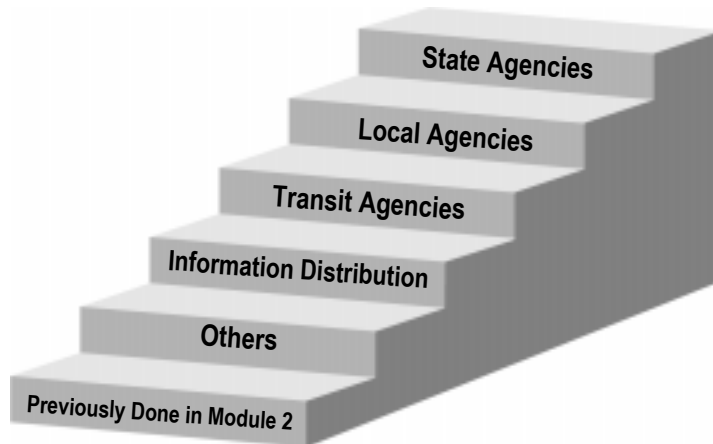
N/A

-

M4A.4: Identify ITS Stakeholders

(2 min)

Identify ITS Stakeholders



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Delivery:

- Explain:
 - That you can not emphasize enough just how important it is to get everyone within the region involved with/in ITS deployment and integration efforts → including agency, primary, and other stakeholders
 - “Remember it takes agencies and people who are interested to move ITS projects forward”
 - “Does your agency “fit-the-bill”? Are you one of these people?”
- Reinforce the notion that agencies need to talk to one another (especially with those other agencies that “own” particular ITS projects that information is desired to/from in order to enhance their agency’s operations)

Output:

- N/A

Notes:

-



Concept-of-Operations

- ◆ Operational concepts are the functional requirements and performance expectations of the “partner” agencies
- ◆ “What the system will do, how it will do it, and how well it will do it”
- ◆ Linked to regional goals and operational objectives

Delivery:

- Explain
 - Basically, these are a collection of agency operational objectives (as identified in Module 2A) which support/promote the agency’s direction
 - That these are usually “high-level” agreements reached by upper management
 - That it expedites the integration process if these agencies “work together” when establishing their concept-of-operations
 - These “concepts-of-operation” need to be linked to regional goals and objectives to show the connection between ITS efforts and what the region is attempting to accomplish.
- ASK:
 - “Is there anything else you would like to add to this “definition?””
 - “Can you identify/list an illustrative example?”
- Instructor facilitates discussion (if any)

Output:

- N/A

Notes:

- Don’t get “bogged-down” with the questions



Concept-of-Operations

“Particular” operational objectives within your agency

“Categorized” operational objectives on a per ITS infrastructure component basis

Delivery:

- **ASK:**
 - “Please look again at the flip-chart list of agency operational objectives which you developed in Module 2A”
 - Flip-chart #2A-6 (FC-2A-6) → Agency Operational Objectives
- **ASK:**
 - “Please look again at the flip-chart list of operational objectives for particular ITS infrastructure components”
 - Flip-chart #2A-7 (FC-2A-7) → ITS Infrastructure Component Operational Objectives
- **ASK:**
 - “Can you refine the operational objectives on the list? For example, can you add functional requirements or performance expectations?”

Output:

- N/A

Notes:

- When in Module 2A, if the instructor “passes-over” completing one or both of these lists/worksheets, then they have to rephrase the question



Concept-of-Operations (Example)

◆ Traffic Signal Control

- ◆ Coordination settings vary throughout the day
- ◆ Area-wide coordination
- ◆ Traffic “adaptive” signal control
- ◆ Use cellular phones to get information



Delivery:

- Explain:
 - TSC examples are typical → not exhaustive
 - “Why concepts-of-operations are important...” and “Why we should use concepts-of-operations...”
 - Establish foundation for
 - *Agency operations (present) and direction (future)*
 - *Further refined/detailed functional and performance requirements*
 - *Agreed-upon Memoranda-of-Understandings (MOUs) between regional agencies*
 - *Validating resource allocations [e.g., staffing decisions (hires/fires), budgeting, scheduling, purchasing and procurements, contracting options, etc.]*
- Instructor facilitates discussion
- ASK:
 - “Can you list/identify a few more typical examples?”
 - *Change signal timings from a central point*
 - *Deploy traffic surveillance/detection equipment which helps the signal system to react “quickly” to changing traffic conditions*
 - *Implement signal systems which support once-per-second communications*

- *Ensure that the signal system can report all equipment and communications “status” information (for ease of operations and management)*
- *Coordinate signal timings with adjacent jurisdictions’ and regional agencies’ arterial street systems*
- *Coordinate signal timings with adjacent FMS*
- *At least 95% of all surveillance/detection equipment shall be in “good” operating condition at any one time*
- Instructor facilitates discussion

Output:

- N/A

Notes:

-



Concept-of-Operations (Example)

◆ Transit Management

- ◆ Provide real-time information/status to travelers about schedule adherence and timely arrivals
- ◆ Re-route transit vehicles around major incident



Delivery:

- Explain:
 - TMS examples are typical → not exhaustive
 - “Why concepts-of-operations are important...” and “Why we should use concepts-of-operations...”
 - Establish foundation for
 - *Agency operations (present) and direction (future)*
 - *Further refined/detailed functional and performance requirements*
 - *Agreed-upon Memoranda-of-Understandings (MOUs) between regional agencies*
 - *Validating resource allocations [e.g., staffing decisions (hires/fires), budgeting, scheduling, purchasing and procurements, contracting options, etc.]*
- Instructor facilitates discussion
- ASK:
 - “Can you list/identify a few more typical examples?”
 - *Dispatch buses from a central point*
 - *Deploy traffic surveillance/detection equipment (on the roadway and transit vehicle) which helps the signal system to react “quickly” to TMS requests for transit “priority” through a signalized intersection*

- *Implement communication systems which support driver-to-dispatch communiqués and “silent” alarms*
- *Ensure that the on-board transit vehicle diagnostic system can report all equipment and communications “status” information (for ease of operations and management)*
- *Coordinate scheduling and routing with adjacent jurisdictions’ and regional agencies’ TMS*
- *Coordinate operations with TSC (transit priority), FMS (transit priority), and IM (re-routing/re-scheduling around an incident)*
- *At least 95% of all transit vehicles shall be in “good” operating condition at any one time*
- Instructor facilitates discussion

Output:

- N/A

Notes:

-

M4A.9: Operational Implications of Information Sharing (1 min)



Operational Implications of Information Sharing

Agency “current” level of information sharing

Agency “desired” level of information sharing

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Delivery:

- **ASK:**
 - “Please retrieve two (2) lists which you developed in Module 3A
 - Worksheet #3A-1 (WS-3A-1) → Agency “Current” Level of Information Sharing
 - Worksheet #3A-2 (WS-3A-2) → Agency “Desired” Level of Information Sharing
- This is all you do in this slide. You are preparing for the exercise on the next slide.

Output:

- N/A

Notes:

- When in Module 3A, if the instructor “passes-over” completing one or both of these lists/worksheets, then they have to rephrase the question

M4A.10: Operational Implications of Information Sharing (5 min)



Operational Implications of Information Sharing

- ◆ “Match-up” current operational objectives with:

- ◆ “Current” level of information sharing
- ◆ “Desired” level of information sharing

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Delivery :

- **ASK:**
 - “Any volunteers?” – Put responses on a flip-chart
 - “...To “match-up” your agency’s current operational objectives with”
 - “...your current level of information sharing” (**FC-4A-1**)

FC-4A-1

Operational Objective	Current Level of Information Sharing
↓	↓

- Instructor facilitates discussion
- **ASK:**
 - “Any volunteers?” – Put responses on a flip-chart
 - “...To “match-up” your agency’s current operational objectives with”
 - “...your desired level of information sharing” (**FC-4A-2**)

FC-4A-2

Operational Objective	Desired Level of Information Sharing
↓	↓

- Information sharing is not the “end-of-the-line” but the means for improved agency operations and service to the traveling public
- Emphasis is on integration as an “enabler”
- Instructor facilitates discussion

Output:

- List of a particular agency’s operational objectives “matched-up” with their “current” level of information sharing (**FC-4A-1**)
- List of a particular agency’s operational objectives “matched-up” with their “desired” level of information sharing (**FC-4A-2**)

Notes:

-

M4A.11: Operational Implications of Information Sharing (3 min)



Operational Implications of Information Sharing

- ◆ The identified information sharing “gap” should indicate where agency operations need to be “re-addressed”
- ◆ The identified agency operations “gap” should indicate where information sharing arrangements need to be “re-addressed”



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Delivery:

- Explain
 - How information sharing “gaps” affect agency operations
 - *For example, agency can not perform operation without this “shared” information*
 - How agency operations affect information sharing
 - *For example, specific operation “determines” what information needs to be shared*
 - Although it may be “easier” to create your “own” system --> there are more benefits to be gained by building on someone else’s!!
- ASK:
 - “What other relationships do you see between information sharing and an agency’s operations?”
- Instructor facilitates discussion

Output:

- N/A

Notes:

-



Types of Information Sharing

- ◆ Information Sharing
- ◆ Direct Interaction
- ◆ Standard operating Procedures
- ◆ Decision Support System
- ◆ Expert System

Delivery:

- Information Sharing
 - *Agencies share “raw” data and/or “refined” information in order to support integrated operations in a region*
- Direct Interaction
 - *Situation occurs, agencies talk to one another in real-time and develop solution “on-the-spot/on-the-go” based on past experiences, current situation, and pertinent characteristics*
- Standard Operating Procedures (SOP)
 - *Agencies “write-down” and “agree-to” pre-defined policies and procedures from which solution(s) to a specific situation has already been “captured/developed”*
 - *Agency operators use SOP as solution framework/guide and work in real-time with other agencies to develop “final” solution*
- Decision Support System (DSS)
 - *Basically, the same as SOP...*
 - *Except that agency interaction has been automated to some degree so that agency operators are primarily just “approving” a good recommendation*
- Expert System (ES)
 - *Same as DSS...*
 - *Except that there is usually not any agency operator intervention required*

Output: N/A

Notes:

-

M4A.13: Types of Information Sharing (1st Generation) (1 min)



Types of Information Sharing

- ◆ 1st generation—information sharing
- ◆ Examples
 - ◆ Share/distribute CCTV video images
 - ◆ Pass-along/share incident locations
 - ◆ Provide transit vehicle routes/schedules/status

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Delivery:

- This is covered in Module 3A. Don't spend much time on this slide, rather affirm the concept presented in Module 3A
- Explain
 - Information sharing is usually a low-risk initiative with a high return-on-investment
 - Here are a few good examples...
- ASK:
 - “Can you think of any other examples of information sharing that are currently occurring back in your region?”
 - *Other examples*
 - *Monitoring of traffic signal plans*
 - *Monitoring of freeway traffic conditions*
- Instructor facilitates discussion (if any)

Output:

- N/A

Notes:

-

M4A.14: Types of Information Sharing (2nd Generation) (1 min)



Types of Information Sharing

- ◆ 2nd generation—responsibility sharing
- ◆ Examples
 - ◆ Signal and ramp metering timing coordination
 - ◆ Transit “priority”
 - ◆ 24-hours-a-day/7-days-a-week operations (24/7)

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Delivery:

- This is covered in Module 3A. Don’t spend much time on this slide, rather affirm the concept presented in Module 3A
- Explain
 - Responsibility sharing can be somewhat controversial → because it can mean that another agency can “operate” your systems
 - Therefore, extremely important that you “get-everything-in-writing”
 - Pre-defined policies and standard-operating-procedures (SOP)
 - Memoranda-of-Understanding (MOUs)
 - Can have an extremely high return-on-investment
 - Here are a few good examples...
- ASK:
 - “Can you think of any examples of responsibility sharing that are currently occurring back in your region?”
 - *Other examples*
 - *CCTV camera control*
 - *Broadcast of traveler information messages*
 - *Emergency vehicle dispatching*
- Instructor facilitates discussion (if any)

Output:

- N/A



“Sharing” Examples

- ◆ Information sharing
 - ◆ Caltrans D12, City of Anaheim, and City of Irvine (Orange County, CA)
- ◆ Direct interaction
 - ◆ “Basic” day-to-day approach
- ◆ Standard operating procedures (SOP)
 - ◆ Seattle Incident Management Plan (Seattle, WA)
- ◆ Any local examples?

Delivery:

- Explain listed example or similar one(s) from your own experience
- ASK:
 - “Can you recall a “sharing” example from your own experience/exposure that fits one of these categories?”
- Instructor facilitates discussion (if any)

Output:

- N/A

Notes:

-

M4A.16: Operational Implications of Info Sharing (Example) (5 min)



Operational Implications of Information Sharing (Example)

- ◆ **Traffic Signal Control (current)**
 - ◆ Optimize coordinated throughput of vehicles at signalized intersections
- ◆ **Freeway Management (desired)**
 - ◆ Ability to coordinate diversion strategies (e.g., ramp metering rates, signal timings, signing strategies, etc.) during an incident

Delivery:

- Explain
 - The situation which is listed on the slide
 - Embellish as you see fit (but without “modifying” the example’s desired result)

Output:

- N/A

Notes:

-



Operational Implications of Information Sharing (Example)

- ◆ **Traffic Signal Control (resultant)**
 - ◆ Provide ability to accommodate additional traffic volumes diverted from freeway through directional “flush” signal timings
 - ◆ Provide ability to get coordinated signal timings “back-to-normal”

Delivery:

- Explain
 - The situation which is listed on the slide
 - Embellish as you see fit (but without “modifying” the example’s desired result)
- **ASK:**
 - “Can you think of any other “resultant” TSC operations for this example?”
- Instructor facilitates discussion

Output:

- N/A

Notes:

-



Operational Implications of Information Sharing (Example)

◆ Freeway Management (resultant)

- ◆ Provide incident notification to Traffic Signal Control to initiate pre-defined, agreed-upon signal timings
- ◆ Provide signing strategies (e.g., VMS, portable VMS, HAR, etc.) to tell motorists about upcoming diversion/re-routing

Delivery:

- Explain
 - The situation which is listed on the slide
 - Embellish as you see fit (but without “modifying” the example’s desired result)
- ASK:
 - “Can you think of any other “resultant” FMS operations for this example?”
- Instructor facilitates discussion

Output:

- N/A

Notes:

-



Can It Be Done?

- ◆ “Willingness” of agencies to support resultant operations
 - ◆ Institutional
 - ◆ Technical
 - ◆ Financial

Delivery:

- Explain
 - That “willingness” to do something/anything is “key”
 - *Emphasis will be on an agency’s “willingness” to support any new information sharing capabilities and/or operations*
 - Institutional
 - *Institutional barrier(s) to overcome (i.e., “we’ve-never-done-it-that-way-before”, “why-should-we-change”)*
 - Technical
 - *Technical capabilities (i.e., ability of the agency to provide or receive the needed information*
 - *Looked at “agency-to-agency” → now need to look throughout region → possible need to create a “regional data repository”*
 - *Possible need to “retrofit” legacy systems*
 - Financial
 - *Financial ability to procure new systems and/or enhance operations*
 - Thinking Point
 - *How do we technically and functionally “fit” systems together that you need to talk to one another (that maybe do not talk to one another right now) in order to share information...*
- ASK:
 - “Are there any other examples that you can provide from your own experience/exposure?”

- Instructor facilitates discussion

Output:

- N/A

Notes:

-



“Who Can Help...”

- ◆ Scanning tours
- ◆ Peer-to-peer group
- ◆ ITS specialists
 - ◆ Agency
 - ◆ USDOT (FHWA/ FTA/ Volpe Center)
 - ◆ Consultants

Delivery:

- Explain
 - That these agencies/groups/people are skilled in this area and can help get you started down the right path to successful integration...
 - 1st bullet
 - Scanning tours sponsored by FHWA have been very effective at informing elected officials.
 - 2nd bullet
 - Technical group of public sector staff who have done this before
 - For FHWA/FTA peer assistance, contact FHWA or FTA Regional ITS Specialists
 - 3rd bullet
 - FHWA-/FTA-sponsored visits to existing ITS activity sites
- ASK:
 - “Are there any other “ways” to help that we have not identified?”
- Instructor facilitates discussion

Output:

- N/A

Notes:

-



Potential Benefits of Integration

- ◆ **Coordinated:**

- ◆ Incident response
- ◆ Traveler information

- ◆ **Reduced development cost/risk**

- ◆ **Shared:**

- ◆ Communications
- ◆ Facilities
- ◆ 24-hours-a-day/7-days-a-week operations
- ◆ Data

Delivery:

- Explain
 - That these integration examples can be realized. However, each of these benefits also carries potential liabilities. For example, coordination requires an additional level of communications. Don't overplay the benefits, be realistic.
- **ASK:**
 - "Are any of these examples currently occurring in your region?"
- Instructor facilitates discussion
- **ASK:**
 - "Are there any other integration examples that you can provide?"
- Instructor facilitates discussion

Output:

- N/A

Notes:

-

M4A.22 -- What Makes Integration Possible --> Telecommunications (3 min)



What Makes Integration Possible---Telecommunications

- ◆ Provides the critical links between subsystems
 - ◆ Informational backbone for ITS infrastructure will transmit voice messages, video images, and control and surveillance data

Delivery:

- Explain
 - Facilitates agency information- and responsibility-sharing
 - Facilitates dispatching and response efforts
 - Promote network interoperability
 - Develop “seamless” communications network indiscernible to users
 - Interoperability (machine independent)
 - Compatibility
 - Interchangeability (vendor independent)
 - Communications technology selected/used is a local design decision
 - Requirements identify the “what” (i.e., subsystem links and data flows) not the “how” (i.e., communications media type)
 - Financial issues
 - Most costly aspect of ITS
 - Cost sharing between public agencies to implement common communications network
 - Multiple jurisdictions can contribute their “fair share”
 - Equitable financing strategies lower overall cost on “per agency” basis
 - Resource sharing opportunities
 - Lease vs. buy options (local choice)

- Life-cycle costing
- Technical issues
 - Need to identify existing and planned ITS systems and components for regional deployment and integration
 - Functions to support
 - Capacity needs
 - Protocol/standards requirements

Output:

- N/A

Notes:

-

M4A.23 -- What Makes Integration Possible --> Telecommunications (5 min)



What Makes Integration Possible---Telecommunications

- ◆ Wireless wide area network (WAN) communications
- ◆ Dedicated short-range communications (DSRC)
- ◆ Wireline WAN communications
- ◆ Vehicle-to-vehicle communications

Delivery:

- Wireless wide-area network (WAN)
 - Link provides direct 2-way contact between a vehicle and an infrastructure-based system
 - Cellular radio/telephone
 - Special mobile radio (SMR)
 - Cellular digital packet data (CDPD)
 - Link provides 1-way “broadcast” capabilities
 - FM subcarrier
 - Paging systems
 - TV blanking interval
 - Link provides 2-way contact between landline locations
 - Spread spectrum radio
 - Microwave
 - Satellite
 - Future low earth orbit satellites (LEOs)
 - “Best-suited” to support these ITS applications
 - Traveler information distribution
 - Infrastructure-assisted-based route guidance/selection
 - Commercial vehicle to fleet management operations
 - Transit vehicle to fleet management operations
 - Emergency services request

- Dedicated short-range communications (DSRC)
 - This communications type is dedicated for short-range (up to 200 feet) communications between vehicles and the nearby infrastructure
 - “Best-suited” for these ITS applications
 - Electronic toll collection (ETC)
 - Commercial vehicle operations (CVO)
 - Fleet management
 - Weigh station by-pass (mainline screening)
 - International/state border crossings
 - Probe vehicle data collection
 - Signal priority/pre-emption request
- Wireline WAN
 - Link provides 2-way, infrastructure-based connections
 - Fiber-optics
 - Coaxial cable
 - Twisted pair
 - Leased telephone lines (dedicated/switched or dial-up)
 - “Best-suited” for these ITS applications
 - TSC and FMS
 - Communications “backbone/trunk”
 - Field device to/from controller
 - Controller to/from center
 - ETC
 - Toll plazas to financial administration centers
 - CVO
 - Checkpoints to regulatory financial administration centers
 - ISP/TIS
 - Call-in “hotlines”
 - Kiosk terminals
- Vehicle-to-vehicle
 - Link provides direct 2-way communications path between adjacent vehicles
 - Used in automated highway systems (AHS)applications

Output:

- N/A

Notes:

-